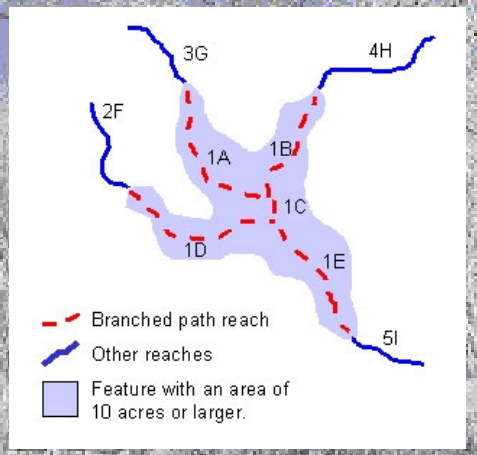
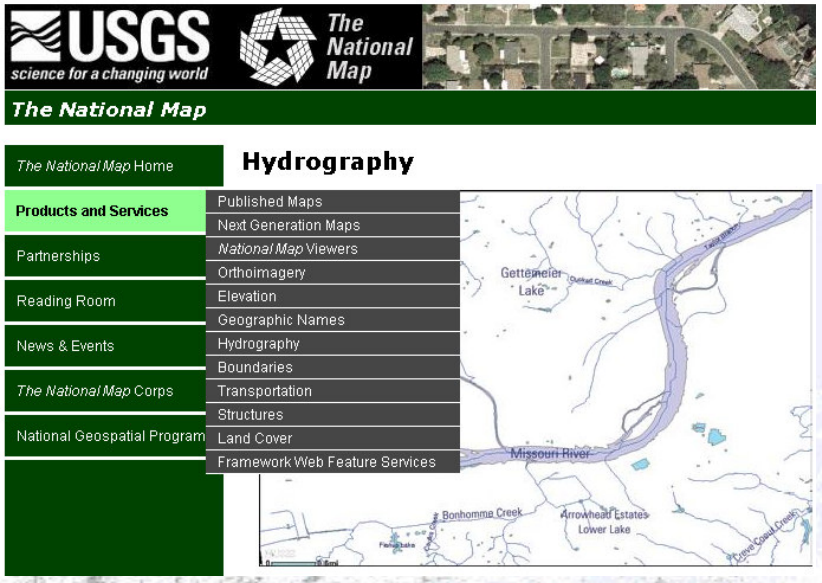
The National Hydrography Dataset (NHD)



U.S. Geological Survey
U.S. Environmental Protection Agency
U.S. Department of Agriculture Forest Service
U.S. Department of Interior's National Park Service
Bureau of Land Management

What is NHD



National Hydrography Dataset (NHD)

- combined dataset
- provides seamless hydrographic data for the United States *"The National Map"*
- contains information about surface water features
  - lakes, ponds,
  - streams, rivers,
  - springs
  - wells

How Maine's NHD developed

Maine Office of GIS (MEGIS) partnered with U.S. Geological Survey (USGS)

USGS / MEGIS grant project goal:

enhance Maine's 1:24,000 hydrography data to create high-resolution NHD

MEGIS

USGS
science for a changing world

DEPARTMENT OF
Environmental Protection
STATE OF MAINE

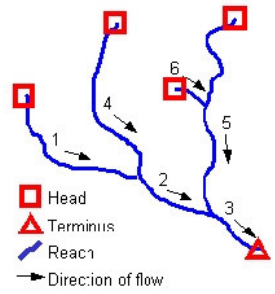
Description of Data

NHDinGEO

NHD data in ESRI geodatabase format

6 main feature classes

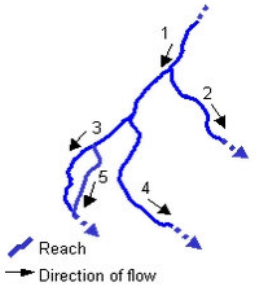
- NHDFlowline
- NHDWaterbody
- NHDPoint
- NHDArea
- NHDLine
- HYDRO_NET



Flow Relations		
Common Identifier for First Reach	Common Identifier for Second Reach	Direction Description
1	2	In
4	2	In
6	5	In
5	3	In
2	3	In
0	1	Network Start
0	4	Network Start
0	6	Network Start
0	5	Network Start
3	0	Network End

Figure 6. Flow relations illustrating in, out, network start, and network end directions.

(A common identifier value of "0" represents a null entry.)

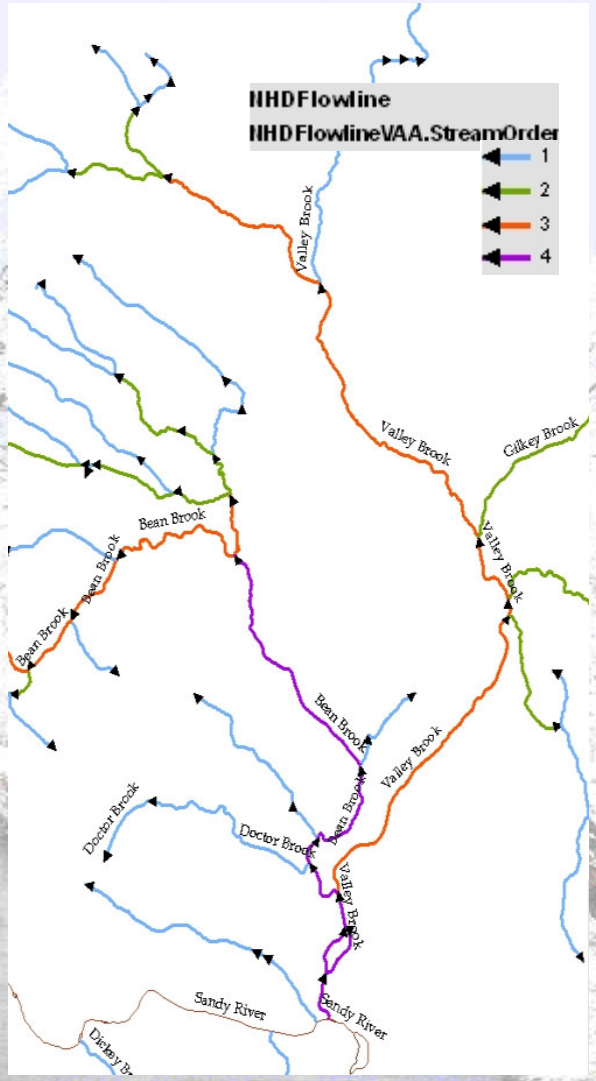


Flow Relations		
Common Identifier for First Reach	Common Identifier for Second Reach	Direction Description
1	3	In
1	4	In
2	1	Out
5	3	Out
5	3	In

Hydrography Feature Classes

NHDFlowline
main linear network of surface water drainage

- streams
- artificial paths
- connectors
- pipelines
- shorelines.



Hydrography Feature Classes

NHDWaterbody

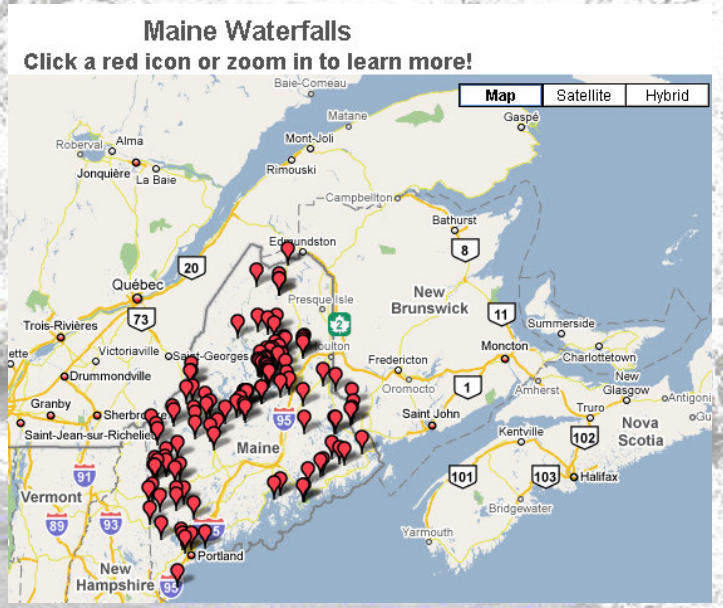
hydrographic waterbody features:

lakes, ponds,
swamps, marshes
floodways & floodplains

NHDPoint

hydrographic landmark features:

gaging station,
rock,
spring/seep
waterfall

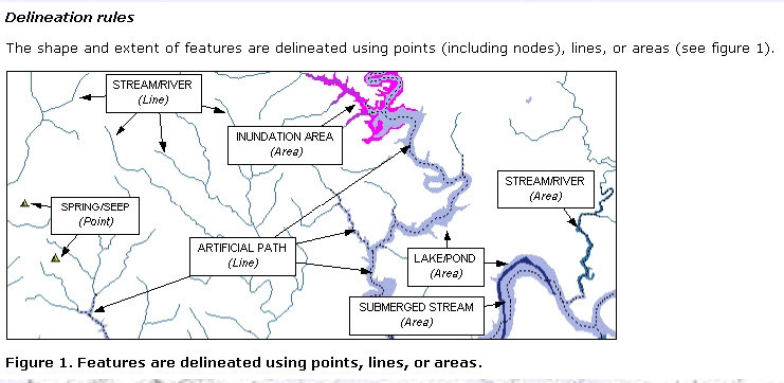


Hydrography Feature Classes

NHDArea

hydrographic landmark features:

- sea/ocean
- stream/river



NHDLine

linear hydrographic landmark features:

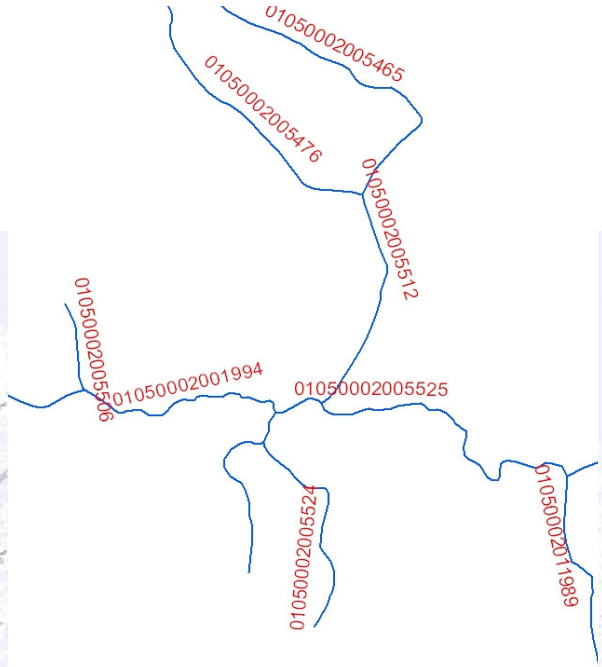
- dams
- bridges, gates

HYDRO_NET

- geometric network for flow navigations

Event tables are also included for point, line and area events.

Characteristics of the National Hydrography Dataset



Unique ***reach*** codes:

- networked features
- isolated water bodies

structured to accommodate higher resolution data

*"A **reach** is a continuous piece of surface water with similar hydrologic characteristics - such as a stretch of stream between two confluences"*

Attributes in NHD

Feature Code	Feature Type	Characteristic | Value
		Feature type only: no attributes
34300	DAM/WEIR	Construction Material|earthen; Operational Status|operational
34301	DAM/WEIR	Construction Material|earthen; Operational Status|under construction
34302	DAM/WEIR	Construction Material|nonearthen; Operational Status|operational
34303	DAM/WEIR	Construction Material|nonearthen; Operational Status|under construction
34304	DAM/WEIR	

Feature codes are stored in a data element named "FCODE".

FCode & Ftype

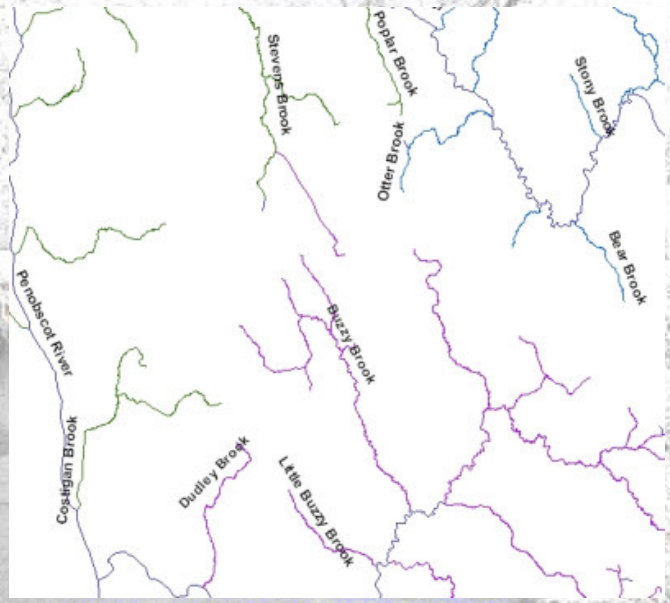
codes that contain information as to the type of feature

Geographic Names Information System (GNIS)

Federally recognized name of a feature

Defines the location of the feature:

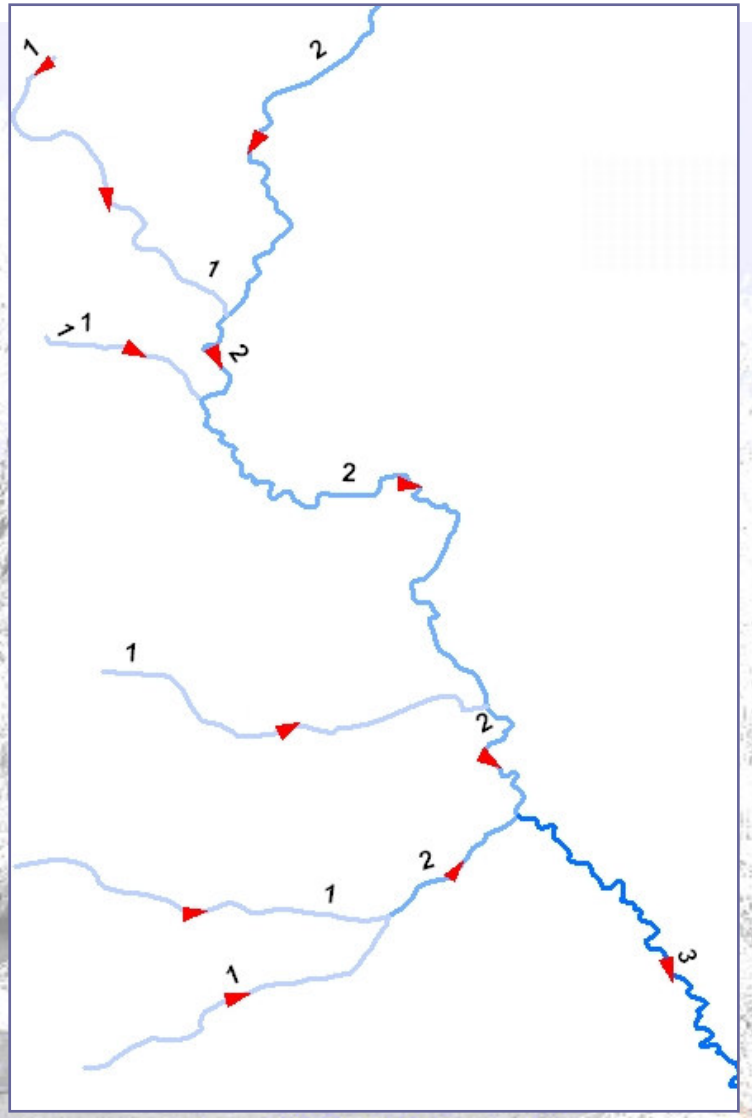
- state,
- county,
- USGS topographic map
- geographic coordinates



Attributes in NHD

Misc attributes contain:

- elevation
- area
- length
- feature update dates



NHD Applications

linked water related data through “reaches”

enable analysis and display of

data in upstream and downstream order

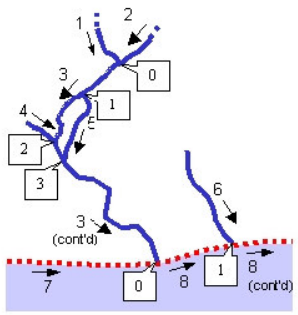
NHD-based network analysis with other data:

soils

land use

population

Understanding & display of affects



Flow Relations

Common Identifier for First Reach	Common Identifier for Second Reach	Direction Description	Sequence
1	3	In	0
2	3	In	0
5	3	Out	1
5	3	In	3
4	3	In	2
3	8	Non-flowing Connection	0
0	6	Network Start	0
6	8	Non-flowing Connection	1
7	8	Non-flowing Connection	0

Figure 10. Sequencing flow relations along transport and coastline reaches.

(A common identifier value of "0" represents a null entry.)

Identifying level paths through the drainage network

Main points:

- A **level path** is a sequence of transport reaches that traces the main stem for a given flow of water.
- **Stream level** identifies the main path to which a transport reach belongs.
- The **delta level** identifies main paths of water flow among flow relations.

Example: **Linear Transport Reach**

Reach Addresses

Description	Program System ID	Reach ID	Begin Position	End Position
WQ Monitoring	WQ-A	1	30	-
303(d) Listed	TMDL-B	3 2	65 0	100 80
Water Quality Standard	WQS-C	3 1	0 0	100 100

The Value of NHD to Maine

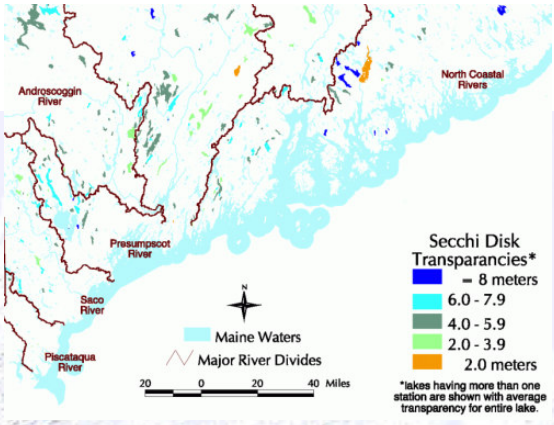
comprehensive hydrographic coverage

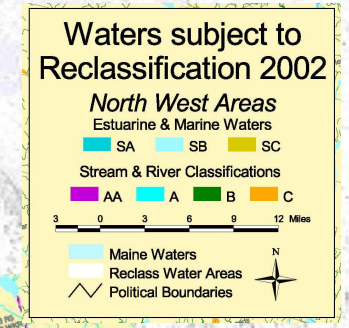
modeling and analytical capabilities

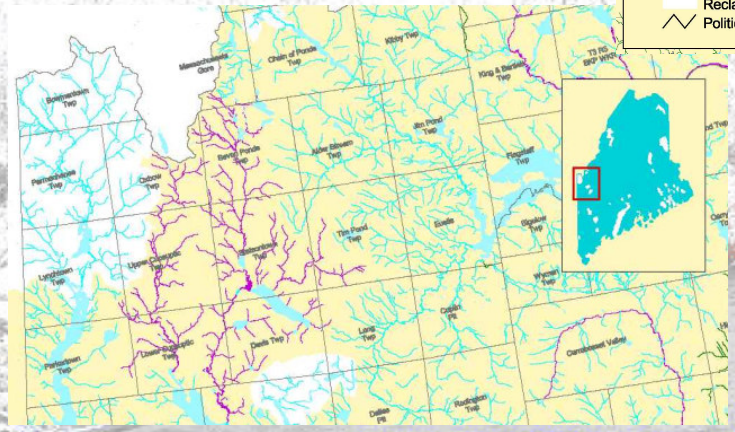
- *cause and affect relationships*

enhanced cartographic applications

"***local*** to national" function & relevance







Maine's Move to NHD

- Tracking pollution discharges
- Applying the Impaired Waters Rule
- Locating fish and aquatic animal habitats
- Better define drainage catchments
- Emergency management (Flooding/Hurricane)
- Tracking upstream/downstream interaction
- Enhance stream classifications
- Stream Level/Stream Order
- Apply event locations

Why use NHD?

Compliment to State & Federal water management programs

"one stop" system / interstate

Ease of Data Sharing:

only attribute data tables that contain the spatial linkages need to be shared

Figure 15 - March 1936 Flood - Little Androscoggin River overflows between Main and South Main Streets, Auburn.

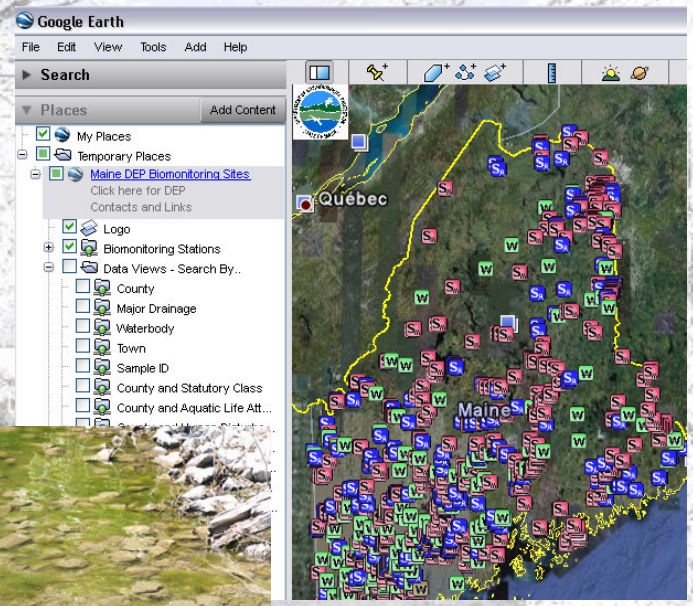
Why use NHD?

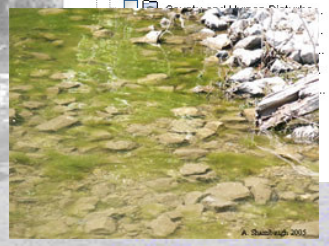
EPA reference to Total Maximum Daily Load (TMDL) data on NHD hydrography

TMDL and 303d (water quality limited) streams referenced against NHD data

Georeference

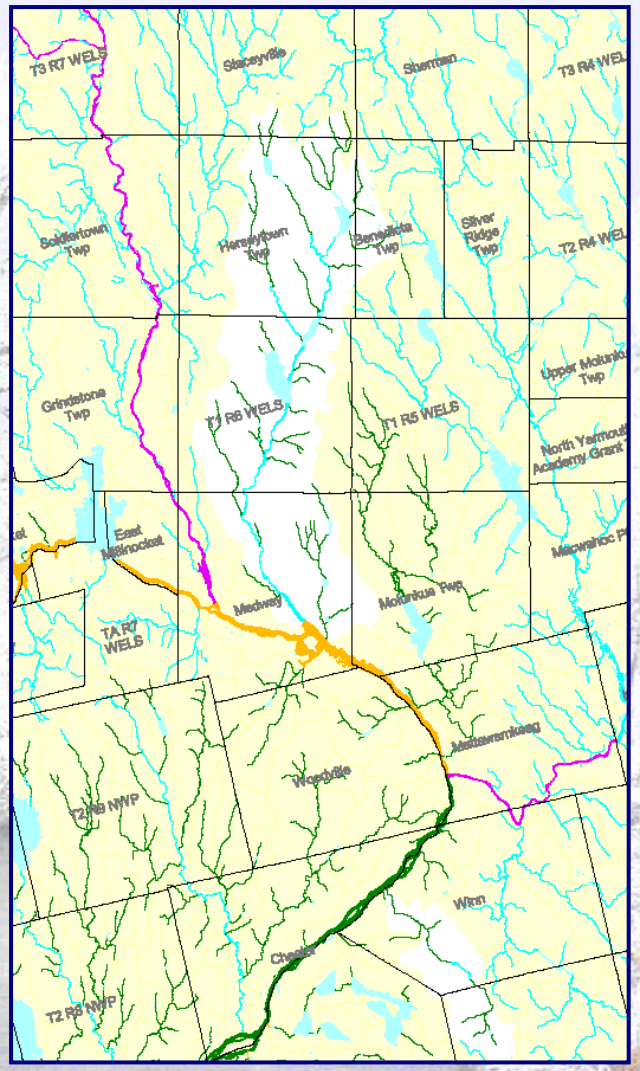
- of fisheries data
- water quality information





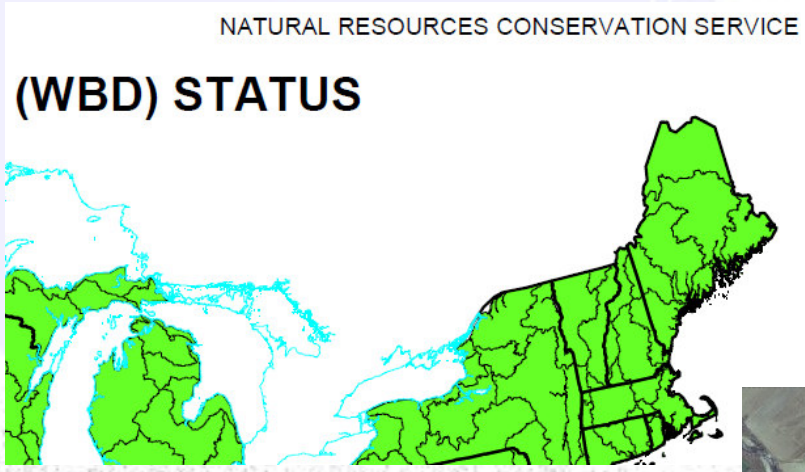
The NHD Stewardship role

- Built, used & maintained
- Knowledge of local hydrography
- Requirements for precise & current data
- Maine has signed a stewardship agreement with the USGS for this purpose



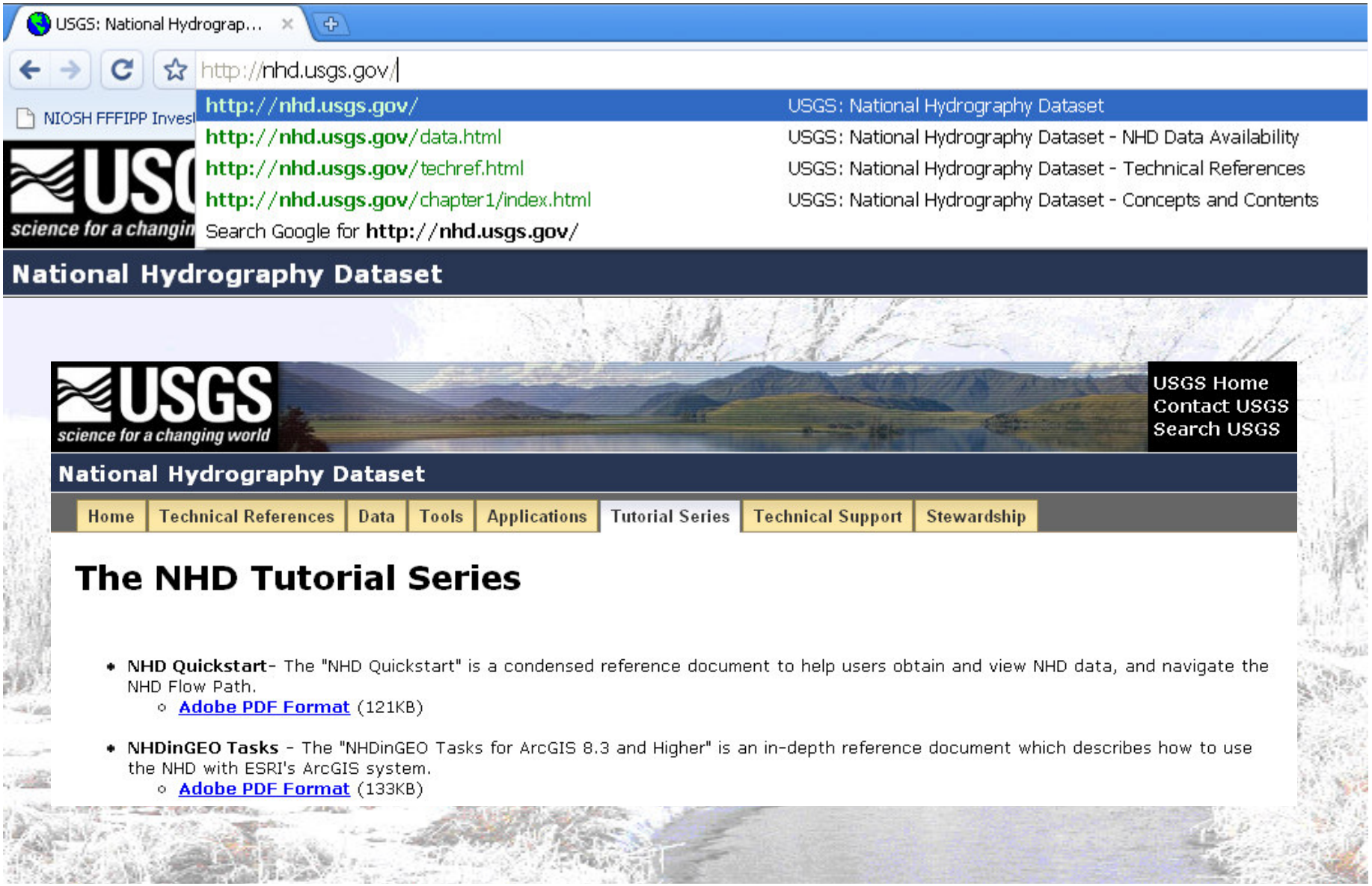
What's in Store for NHD in Maine

Watershed Boundary Dataset (WBD) integration



Local resolution hydrography data

Getting Started

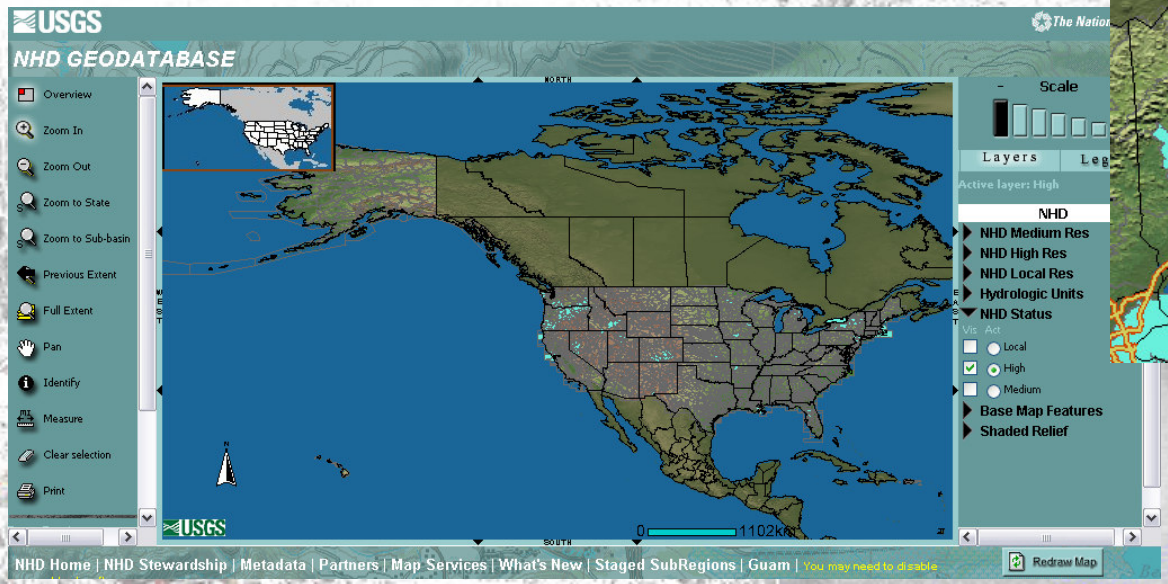


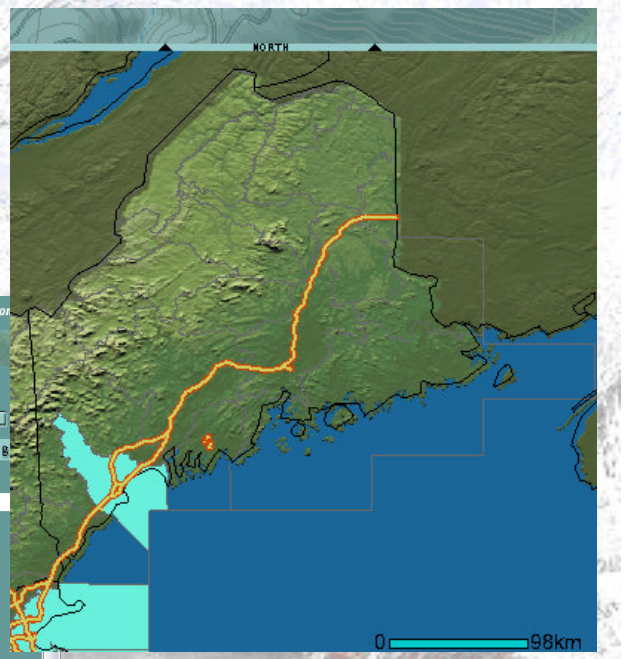
Obtaining NHD data

NHD data will be stored and kept current in the MEGIS SDE database.

Nationwide NHD available for download

NHD Viewer
http://nhdgeo.usgs.gov/viewer.htm





Questions?

http://nhd.usgs.gov